History of FRIB

For more than 150 years, Michigan State University (MSU) has been contributing a wide range of scientific discoveries and development of their practical applications to address society's most pressing problems and promising opportunities. Some examples of MSU's influence on the quality of life in the United States and around the world include: hybrid corn, homogenized milk, and the widely used cancer treatment drug cisplatin. A member of the American Association of Universities (AAU), MSU is one of the top 70 universities in the world, according to the Times Higher Education World Reputation Rankings 2016, and ranks 78th out of 1,000 universities in the latest U.S. News & World Report "Best Global Universities" ranking. For the sixth straight year, MSU's nuclear physics graduate program is ranked No. 1 in the nation, according to *U.S. News and World Report*'s rankings of graduate schools.

A Bold Commitment

The development of Michigan State's prowess in nuclear physics began when MSU's legendary President John A. Hannah seized upon the idea that developing a major program in physics could be a cornerstone of his strategy for growth and diversification of the university. His emerging idea took a major step toward reality when, in 1958, a young man named Henry Blosser came to MSU to build a uniquely powerful cyclotron. Blosser—an ambitious visionary with determination, leadership skills, and theoretical and technical expertise—assembled a remarkable team, and together they succeeded in designing, building, and funding MSU's first cyclotron, the K50, completed in 1965 and used for nuclear physics research with proton beams.

Continual Reinvention

Thus was launched a tradition not only of academic excellence in nuclear physics but of visionary anticipation and response to the quickly advancing frontiers of nuclear science. While 1965-1979 was the K50 era at MSU, by 1973 Blosser and his team were already envisioning what would be required next. They soon began working on acquiring funding, designing, and preparing to build a superconducting magnet, which was the cornerstone for the next generation cyclotron, the K500. Funded by the National Science Foundation (NSF), completion of the K500 in 1982 initiated the superconducting cyclotron era, and the MSU Cyclotron Laboratory became a national user facility for research with heavy ions.

Long before the K500 was complete, the team at MSU was planning the next generation, a coupled superconducting cyclotron system which would add a K1200 post-accelerator to the K500.

Laboratory History

1961
MSU Cyclotron Laboratory

1977
MSU/NSF Heavy Ion Laboratory

1980
National Superconducting Cyclotron Laboratory (NSCL)

2022
Facility for Rare Isotope Beams (FRIB)

Their proposal, after much deliberation, was selected in 1978 by the newly created Nuclear Science Advisory Committee (NSAC) to NSF and the Department of Energy (DOE) for development as the National Superconducting Cyclotron Laboratory (NSCL). The K1200 was completed in 1988 and by 1990 was operating with the A1200 fragment separator to produce beams of rare isotopes through in-flight fragmentation of heavy-ion beams. Plans were already in motion that led in 2001 to the coupled cyclotron facility with the A1900 fragment separator—the world's most powerful rare isotope facility.

The Next Frontier

This decade-by-decade march provided the foundation of vision, design and construction, user facility management, and leadership in nuclear physics research and education that became MSU's competitive edge in winning the Facility for Rare Isotope Beams.

Since the early 1990s nuclear physicists had been discussing the need for a facility to produce intense beams of rare isotopes. A decision on how to proceed was made by an NSAC taskforce that presented its recommendations to NSF and DOE in 1999; they closely reflected a plan for rare isotope beam production that had been proposed by MSU. NSCL leadership and scientists saw this as their next opportunity and immediately began developing detailed design plans. By year's end, they made a presentation to NSF and DOE on the benefits of siting the new facility at MSU, which included a proposal for in-flight fragmentation. After a rigorous competition, the DOE Office of Science (DOE-SC) awarded the project to MSU in 2008.

The partnership to create, build, and operate the $730 million FRIB will deliver a world-class DOE-SC scientific user facility that will ensure the nation's continued competitiveness in nuclear science through provision of unprecedented discovery potential. Scheduled for completion in 2022, it will host scientists who will conduct experiments, extend the frontier of nuclear science, and help define the next frontier and—for FRIB and MSU—the next reinvention needed to reach and transcend it.

Progression of Experimental Capability at MSU

1965
K50 (cyclotron for protons)

1977
Superconducting magnet

1982
K500 (superconducting cyclotron for heavy ions)

1988
K1200 (superconducting cyclotron for heavy ions)

1990
A1200 beams (in-flight separated rare isotopes)

2001
Coupled cyclotron facility (world's most powerful rare isotope facility until 2007)

2005
LEBIT – Low Energy Beam and Ion Trap (stopped rare isotopes)

2014
ReA3 (re-accelerated rare isotopes)

2022
FRIB (fast, stopped, reaccelerated rare isotopes)